

A review of the Australasian species of *Anapistula* Gertsch (Araneae: Symphytognathidae)

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Abstract – The Australasian species of *Anapistula* Gertsch are revised and six species are recognised: *A. australia* Forster (Queensland), *A. troglobia* sp. nov. (Western Australia), *A. bifurcata* sp. nov. (Northern Territory), *A. cuttacutta* sp. nov. (Northern Territory), *A. jerai* sp. nov. (Malaysia, Sarawak, Kalimantan and Krakatau Islands) and *A. tonga* sp. nov. (Tonga). *A. troglobia* and *A. cuttacutta* are the first known troglobitic species of the family Symphytognathidae and *Anapistula* is hypothesised to be the sister-group of the remaining symphytognathid genera. The male pedipalp of the type species, *A. secreta* Gertsch, is illustrated, and the systematic position of the only other New World species, *A. boneti* Forster, is discussed.

INTRODUCTION

The Symphytognathidae, as currently defined (Forster and Platnick 1977), contains five genera found in numerous tropical and southern temperate zones of the world. All genera have representatives in the New World but only *Curimagua* Forster and Platnick and *Globignatha* Balogh and Loksá are restricted to this region. The remaining genera, *Symphytognatha* Hickman, *Patu* Marples and *Anapistula* Gertsch, are found in various other regions, such as Australia, New Guinea, islands of the Pacific and Indian Oceans, and Africa. Griswold (1987) postulated that *Symphytognatha* might be an ancient genus, and it seems probable that many other genera predate the breakup of Gondwana during the Cretaceous.

The genus *Anapistula* differs from all other symphytognathid genera by a low carapace and the retention of posterior spiracles (Forster and Platnick 1977), and currently contains six species with widely disjunct distributions: *A. secreta* Gertsch from central America (extending as far north as Florida and as far south as Colombia), *A. boneti* Forster from Mexico, *A. benoiti* Forster and Platnick from Zaire, *A. australia* Forster from south-eastern Queensland, *A. caecula* Baert and Jocqué from Ivory Coast, and *A. seychellensis* Saaristo from the Seychelles (see Forster and Platnick 1977; Baert and Jocqué 1993; Saaristo 1996). The recent discovery of a remarkable troglobitic species from Western Australia (Harvey *et al.* 1993) has prompted a review of the Australasian species of *Anapistula*, the results of which are presented here. For comparative purposes, the two American species, *A. secreta* Gertsch and *A. boneti* Forster, are also illustrated and discussed.

The material discussed here is lodged in the American Museum of Natural History, New York (AMNH), Australian Museum, Sydney (AM), Australian National Insect Collection, CSIRO, Canberra (ANIC), C.L. Deeleman collection, Ossendrecht, Netherlands (CLD), Museum of Victoria, Melbourne (NMV), Northern Territory Museum, Darwin (NTM), Queensland Museum, Brisbane (QM) and Western Australian Museum, Perth (WAM). Terminology follows Forster and Platnick (1977), with the elements of the conductor discussed by Harvey (1992). All measurements are in mm.

SYSTEMATICS

Genus *Anapistula* Gertsch

Anapistula Gertsch 1941: 2; Forster and Platnick 1977: 21–22.

Type Species

Anapistula secreta Gertsch 1941, by original designation.

Diagnosis

Pars cephalica only slightly elevated. Posterior spiracles present. Six or four eyes present, sometimes reduced to indistinct spots; PME's usually absent; when present, adjacent, far removed from lateral eyes.

Remarks

The Symphytognathidae appear to be divisible into two groups, the first containing the sole genus *Anapistula* and the second containing the remaining genera, *Symphytognatha*, *Globignatha*, *Curimagua*

and *Patu*). This division is based upon two character states:

The pars cephalica of all *Anapistula* species is only slightly elevated; whereas it is strongly raised in all other symphytognathids (Forster and Platnick 1977) and in most members of other families currently postulated as putative sister-groups to the Symphytognathidae (Coddington 1990; Coddington and Levi 1991), Anapidae and Mysmenidae [e.g. see illustrations in Gertsch (1960) and Platnick and Forster (1989)]. The former condition appears to represent a synapomorphy for *Anapistula*, but a low pars cephalica is also widespread throughout the Araneoidae and it is feasible that it may represent a plesiomorphy for *Anapistula*.

While *Anapistula* species possess the posterior spiracles (Figure 8), these have been lost in all other symphytognathids (Forster and Platnick 1977). The retention of posterior spiracles is clearly plesiomorphic as this condition is shared with numerous other araneoids; the loss of posterior spiracles represents an apomorphy which defines the remaining symphytognathids.

Platnick and Forster (1989, p. 76) suggested that the Asian genus *Anapogonia* Simon may belong to the Symphytognathidae, noting that the limits of the family would require adjustment due to the unfused chelicerae, currently considered an apomorphy of the family (Forster and Platnick 1977). The nature of the posterior spiracles of the type species, *A. lyrata* Simon, are not yet known and its placement within the arrangement suggested above is currently untested. The two groups defined above may eventually deserve subfamilial status, once the position of *Anapogonia* is tested and ascertained.

With the addition of the five new species of *Anapistula* described below, the genus now comprises 11 species, six of which are represented by males: *A. secreta* (Figure 1; Forster and Platnick 1977, p. 22), *A. boneti* (Figure 20; Forster 1958: p. 13), *A. bifurcata*, *A. cuttacutta*, *A. jerai* and *A. tonga* (see below). Of interest is the relative uniformity of the pedipalp of five of these species (*A. secreta*, *A. bifurcata*, *A. cuttacutta*, *A. jerai* and *A. tonga*), which possess a broad, triangular ventral element to the conductor (C1) which covers the embolus, and a somewhat spatulate dorsal element to the conductor (C2) with a large subdistal, circular depression (Figures 1, 6, 12, 15).

This pattern is not evident in the male holotype of *A. boneti* (examined, lodged in AMNH), in which the pedipalp, which is somewhat distorted due to permanent slide mounting, shows a number of anomalous features. These include a broad, heavily sclerotised and distally bifurcate ventral conductor element, and the lack of a spatulate central section of the dorsal conductor element which, in contrast,

appears very small, lightly sclerotised and distally digitulate (Figure 20). In addition, the abdomen, which is higher than wide, bears a dorsal scute and a ventral, striated genitalic plate (Figure 21), the legs possess trichobothria, and the PME's are present. It now appears that *A. boneti* should be excluded from the genus *Anapistula*, but its true placement is uncertain and it may not even belong in the Symphytognathidae as all other symphytognathids lack pedal trichobothria (Forster and Platnick 1977). Gertsch (1960) transferred *A. boneti* to *lardinius* Simon, previously known from only the type species, *I. weyersi* Simon from Sumatra, and described *I. albulus* Gertsch from South America. Forster and Platnick (1977) transferred *I. albulus* to the theridiid genus *Styposis* Simon and returned *A. boneti* to *Anapistula*. The final position of *A. boneti* should await further examination of the type, along with newly collected material including a female.

As noted by Forster and Platnick (1977) and Baert and Jocqué (1993), symphytognathids are amongst the smallest of all adult spiders, with males of *Patu digua* Forster and Platnick only 0.37 mm (excluding chelicerae). Baert and Jocqué (1993) record a total body length of 0.48–0.55 mm for females of *Anapistula caecula*, and to this can be added *A. bifurcata* (males 0.48, females 0.52 mm in length) and *A. jerai* (male 0.41, female 0.48 mm in length). Females of the cave-dwelling species *A. troglobia* are 0.80 mm, the large size of which is typical of many troglobitic organisms which are often larger than their epigeic counterparts.

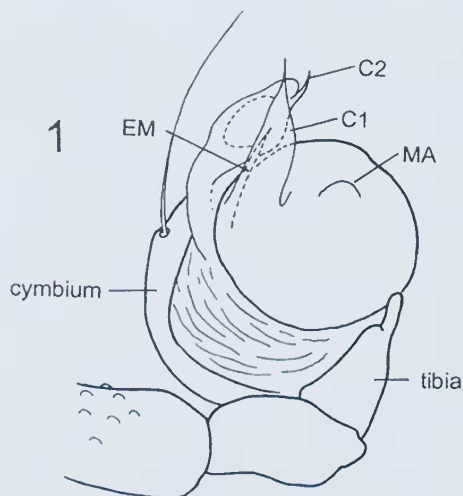


Figure 1 Left pedipalp, retrolateral: 1, *Anapistula secreta* Gertsch (δ from Archbold Biological Station, Highlands County, Florida, U.S.A., AMNH). Abbreviations: C1, conductor, ventral element; C2, conductor, dorsal element; EM, embolus; MA, median apophysis.

Biogeography

It now seems clear that *Anapistula* is a tropical genus, with most members occurring in rainforest habitats, and with the most temperate locality situated at Camp Mountain, near Brisbane, Queensland. The sole exception to the rainforest habitat is *A. troglobia* which occurs in the humid caves of the semi-arid Cape Range, Western Australia. Many other troglobitic members of the Cape Range faunal community also seem to have been derived from tropical elements (e.g. Harvey *et al.* 1993; Humphreys 1993) which highlights the relictual nature of these cave systems.

Key to species of *Anapistula* Gertsch

Males

1. Ventral element of conductor (C1) basally very broad and abruptly tapering (Figure 15)
..... *Anapistula tonga* sp. nov. (Tonga)
Ventral element of conductor (C1) not abruptly tapering (Figures 1, 6, 10, 12) 2
2. Dorsal element of conductor (C2) distally bifurcate (Figure 6) or with lateral flange (Figure 1) 3
Dorsal element of conductor (C2) not distally bifurcate (Figure 12).....
Anapistula jerai sp. nov. (Malaysia, Sarawak, Indonesia)
3. Dorsal element of conductor (C2) with large, distally acute, bifurcations (Figure 6)
Anapistula bifurcata sp. nov. (Australia: Northern Territory)
Dorsal element of conductor (C2) without distal bifurcations (Figures 1, 10) 4
4. Dorsal element of conductor (C2) with serrate process protruding from distal margin (Figure 10) *Anapistula cutlacutta* sp. nov. (Australia: Northern Territory)
Dorsal element of conductor (C2) with rounded lateral flange (Figure 1)... *Anapistula secreta* Gertsch (Florida to Colombia)

Females

1. Femur I with a large retrolateral tubercle (Figure 5) *Anapistula troglobia* sp. nov. (Australia: Western Australia)
Femur I without retrolateral tubercles 2
2. Median epigynal duct not reaching to tip of spermathecae (Forster and Platnick 1977, fig. 74)
Anapistula benoiti Forster and Platnick (Zaire)
Median epigynal duct reaching to tip of spermathecae (Figures 4, 9, 14, 19) 3

3. Spermathecae kidney-shaped (Baert and Jocqué 1993, figure 1)
Anapistula caecula Baert and Jocqué (Ivory Coast)
Spermathecae spherical (Figures 4, 9, 14, 19) . 4
4. Femur I 0.32 mm in length
..... *Anapistula tonga* sp. nov. (Tonga)
Femur I less than 0.30 mm in length 5
5. Femur I 0.26 mm in length
Anapistula bifurcata sp. nov. (Australia: Northern Territory) and *Anapistula jerai* sp. nov. (Malaysia and Indonesia)
Femur I less than 0.25 mm in length 6
6. Femur I 0.23 mm in length *Anapistula seychellensis* Saaristo (Seychelles)
Femur I greater than 0.23 mm in length 7
7. Median epigynal duct somewhat M-shaped (Forster and Platnick 1977, figure 19)
..... *Anapistula secreta* Gertsch (Florida to Colombia)
Median epigynal duct T-shaped (Figure 3)
..... *Anapistula australia* Forster (Australia: Queensland)

Anapistula australia Forster

Figure 2

Anapistula australia Forster 1959: 321, figs 128–132, 158; Forster and Platnick 1977: 24.

Material Examined

Holotype

♀, Camp Mountain, Queensland, Australia [27°24'S, 152°52'E], 26 December 1956, ex litter on sand beside creek, T.E. Woodward (QM S104).

Diagnosis

Anapistula australia appears to be most similar to *A. secreta*, but females of the former differ by the T-shaped median epigynal duct (Figure 2).

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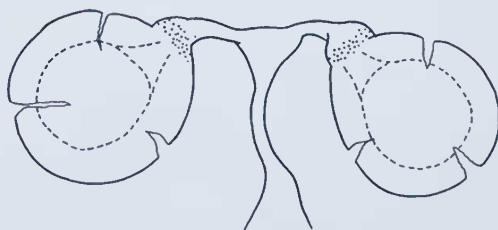


Figure 2 *Anapistula australia* Forster, holotype ♀, epigyne, ventral (slightly crushed in a permanent slide mount).

Description

Female (Holotype)

See Forster (1959).

Remarks

Forster (1959, fig. 130) depicted the presence of a colulus in this species, but my detailed examination of the holotype reveals that a colulus is indeed absent, a character state that now appears invariant within the genus. No further material of this species has been detected in museum collections.

Anapistula troglobia sp. nov.

Figures 3–5

Mysmenopsis sp.: Gray 1989: 87.

Anapistula sp.: Harvey *et al.* 1993: 136.

Material Examined

Holotype

♀, Cave C-15, Cape Range, Western Australia, Australia, 22°13'S, 113°59'E, 25 June 1989, M.S. Harvey (WAM 94/1829).

Paratypes

Australia: Western Australia: Cape Range: 1 ♀, Cave C-15, 28 June 1989, M.S. Harvey (WAM 94/1830); 1 ♀, Cave C-15, 13 August 1992, R. L'Heureux, W.F. Humphreys, R.D. Brooks (WAM 94/1831); 1 ♀, Cave C-167, 30 July 1991, R.D. Brooks (WAM 94/1836); 1 ♀, same data (QM S35047).

Other Material

Australia: Western Australia: Cape Range: 1 juvenile, Cave C-15, 28 June 1989, M.S. Harvey (WAM 94/1832); 1 juvenile, Cave C-15, 13 August 1992, R. L'Heureux, W.F. Humphreys, R.D. Brooks (WAM 94/1833); 1 ♀, 1 juvenile, Cave C-167, 22°09'S, 114°00'E, 21 June 1991, D. Brooks (WAM 94/1834–1835); 2 ♀, Cave C-167, 30 July 1991, C. Rippon (WAM 94/1837–1838); 2 ♀, Cave C-126, 21°47'S, 114°10'E, 19 September 1988, S. Eberhard (AM KS21582).

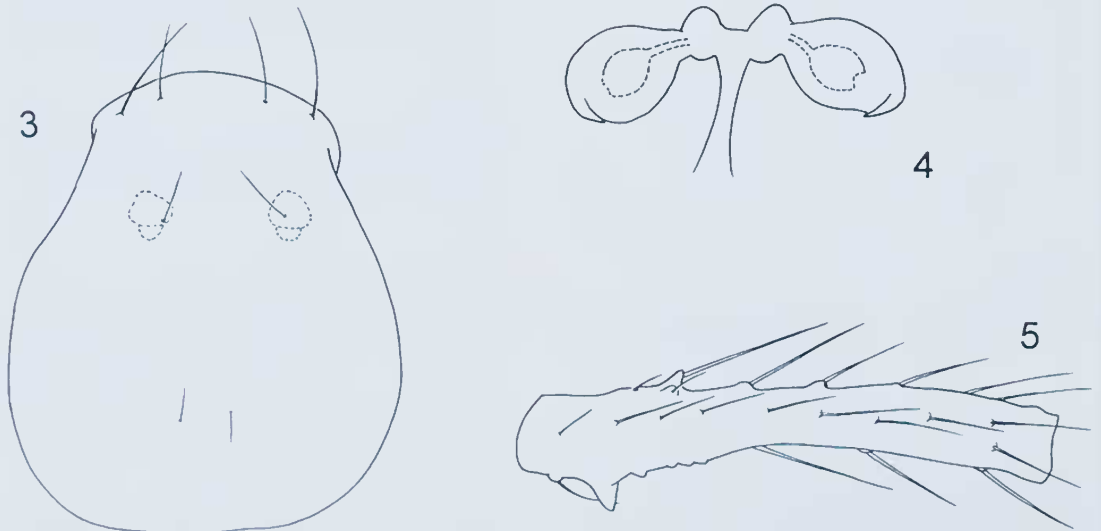
Diagnosis

This species can be distinguished from all other symphytognathids by the subbasal retrolateral tubercle on femur I (Figure 5). Other important characters include the reduction of the eyes to indistinct spots (Figure 3) and the ovoid spermathecae (Figure 4).

Description

Female (Holotype)

Total length 0.80. Carapace 0.29 long, 0.24 wide, 0.13 high. Femur I 0.36 long. Colour entirely creamy-white, except for sclerotised internal genitalia. Carapace (Figure 3) with 8 setae, 4 on clypeus, 2 on eyes, and 2 on posterior ridge of pars cephalica; pars cephalica only slightly higher than pars thoracica; 4 indistinct eye spots present. Chelicerae fused only subbasally; distal lobe of fang furrow with 2 conical teeth. Sternum posteriorly truncate. Pedipalp absent except for coxa. Legs: femur I with 1 large and several small



Figures 3–5 *Anapistula troglobia* sp. nov., holotype ♀: 3, carapace, dorsal; 4, epigyne, ventral; 5, right femur I, dorsal.

subbasal retrolateral tubercles, and several setae sitting in prominent tubercles (Figure 5); all patellae with retrolateral protuberance containing patch of lyriform organs; all tarsal claws without teeth. Epigyne (Figure 4): spermathecae oval, connected to single T-shaped copulatory duct; bases of copulatory duct with anterior swelling; heavily sclerotised triangular apophysis absent. Posterior spiracles present. Colulus absent.

Remarks

Anapistula troglobia is known from only three caves in the karst-rich Cape Range, Western Australia (Harvey *et al.* 1993), and is clearly the most troglotic symphytognathid so far recorded and is only the second recorded from caves. The first, *Curimagua chapmani* Forster and Platnick, was taken from the roost of guacharo birds in entrance chambers of Coy-Coy Cave, Venezuela (Forster and Platnick 1977) and does not appear to exhibit any extreme troglotic tendencies. On the other hand, *A. troglobia* exhibits a number of troglomorphic features, including significant reduction of eyes, extremely pale colouration, and elongated legs. Of the seven troglotic spiders recognised by Harvey *et al.* (1993) from the Cape

Range karsts, *A. troglobia* is the smallest, yet one of the most troglomorphic.

The egg-sac of one female was observed on 28 June 1989; it consisted of two large eggs connected with some loose strands of silk.

Etymology

The specific epithet refers to the presence of this species in caves (Greek: *troglo*, hole; *bios*, life).

Anapistula bifurcata sp. nov.

Figures 6–9

Material Examined

Holotype

♂, gorge to NE. of Mt Gilruth, Northern Territory, Australia, 13°02'S, 133°05'E, July 1979, rainforest, sieved litter, G.B. Monteith (QM S20801).

Paratypes

Australia: Northern Territory: 3 ♀, same data as holotype (QM S35044–35045); 1 ♀, same data as holotype (WAM 97/14).



Figures 6–9 *Anapistula bifurcata* sp. nov., holotype ♂: 6, left pedipalp, retrolateral, with detail of distal end of conductor; 7, left bulb, with conductor omitted, showing embolic duct; female paratype (QM S35044): 8, abdomen, ventral, showing spinnerets, spiracles and vulva; 9, epigyne, ventral.

Other Material

Australia: Northern Territory: 2 juveniles, same data as holotype (QM S35046).

Diagnosis

Males of this species differ by the shape of the dorsal element of the conductor (C2) which is distally bifurcate (Figure 6). Females cannot be separated from those of *A. jeraï*, but differ from all other species by the following combination of characters: spermathecae spherical (Figure 9), median epigynal duct reaching to tip of spermathecae (Figure 9), and femur I 0.26 mm in length.

Description*Male (Holotype)*

Total length 0.48. Carapace 0.26 long, 0.26 wide, 0.14 high. Femur I 0.29 long. Colour entirely pale yellow. Carapace apparently with 8 setae, 4 on clypeus, 2 on eyes, and 2 on posterior ridge of pars cephalica; pars cephalica only slightly higher than pars thoracica; 4 distinct eyes, surrounded by light pigment; PME completely absent. Chelicerae fused only subbasally; distal lobe of fang furrow with 2 conical teeth. Sternum posteriorly truncate. Pedipalp (Figures 6, 7): femur with tubercles on antero-ventral face; tibia without retrolateral apophysis; cymbium broad and cup-shaped, with hooked basal paracymbium; embolus coiled twice, embolic duct looped; median apophysis rounded; conductor comprising two discrete elements which enclose the embolus: ventral element (C1) basally broad and gradually tapering to a distal pointed projection; dorsal element (C2) distally bifurcate and with broad circular depression. Legs: femur I without tubercles; all patellae with retrolateral protuberance containing patch of lyriform organs; all tarsal claws without teeth. Posterior spiracles present. Colulus absent.

Female (Paratype QM S35044)

Total length 0.52. Carapace 0.25 long, 0.24 wide, 0.12 high. Femur I 0.26 long. Colour entirely pale yellow, except for sclerotised internal genitalia. Carapace with 8 setae, 4 on clypeus, 2 on eyes, and 2 on posterior ridge of pars cephalica; pars cephalica only slightly higher than pars thoracica; 4 distinct eyes, surrounded by light pigment; PME completely absent. Chelicerae fused only subbasally; distal lobe of fang furrow with 2 conical teeth. Sternum posteriorly truncate. Pedipalp absent except for coxa. Legs: femur I without tubercles; all patellae with retrolateral protuberance containing patch of lyriform organs; all tarsal claws without teeth. Epigyne (Figure 9): spermathecae spherical, connected to single T-shaped copulatory duct; bases of copulatory duct

with anterior swelling; heavily sclerotised triangular apophysis absent. Posterior spiracles present (Figure 8). Colulus absent.

Remarks

Anapistula bifurcata is known only from a single site lying outside the eastern border of Kakadu National Park, Northern Territory.

Etymology

The specific epithet refers to the bifurcate nature of the dorsal element of the conductor (*bifurcatus*, Latin, split into two parts).

Anapistula cuttacutta sp. nov.

Figures 10–11

Material Examined*Holotype*

♂, Cutta Cutta cave, cave K-1, Northern Territory, Australia, 14°35'S, 132°25'E, 26 June 1994, W. Binks (NTM, transferred from WAM).

Diagnosis

Males of this species differ by the shape of the dorsal element of the conductor (C2) which bears a serrate process protruding from the distal margin (Figure 10).

Description*Male (Holotype)*

Total length unknown. Carapace 0.26 long, 0.25 wide, height not measurable. Femur I 0.35 long. Colour entirely pale yellow. Carapaceal setae not observable; pars cephalica only slightly higher than pars thoracica; apparently without eyes. Chelicerae fused only subbasally; distal lobe of fang furrow with



Figures 10–11 *Anapistula cuttacutta* sp. nov., holotype ♂: 10, left pedipalp, retrolateral; 11, left bulb, with conductor omitted, showing embolic duct.

2 conical teeth. Sternum posteriorly truncate. Pedipalp (Figures 10, 11): presence of tubercles on femur not determined; tibia without retrolateral apophysis; cymbium broad and cup-shaped, with hooked basal paracymbium; embolus coiled twice, embolic duct looped; median apophysis rounded; conductor comprising two discrete elements which enclose the embolus: ventral element (C1) basally broad and gradually tapering to a distal pointed projection; dorsal element (C2) with a serrate process protuding from distal margin, and with broad circular depression. Legs: femur I without tubercles; all patellae with retrolateral protuberance containing patch of lyriform organs; all tarsal claws without teeth. Posterior spiracles present. Colulus absent.

Remarks

The holotype is somewhat damaged, which appears to have occurred at the time of collection. The abdomen is detached from the body, the right pedipalp and two right legs are missing, and the carapace is damaged which makes it extremely difficult to determine the number of eyes and carapaceal setation.

Anapistula cuttacutta is known only from a single male taken from a cave in the Katherine region of the Northern Territory.

Etymology

The specific epithet is a noun in apposition taken from the type locality.

Anapistula jerai sp. nov.

Figures 12–14

Material Examined

Holotype

♂, Gunung Jerai, Kedah State, Malaysia, 5°48'N, 100°26'E, 550 ♂, 12 September 1982, rainforest berlesate, R.W. Taylor, R.A. Barrett (ANIC).

Other Material

Indonesia: Kalimantan Selatan: 1 ♀, E. of Banjarbaru (east of Banjarmasin), 31 July 1980, *Hevea* litter, C.L. and P.R. Deeleman (CLD); **Krakatau Islands:** 1 ♀, Anak Krakatau, 6°06'S, 105°26'E, August 1985, winckler apparatus, Aland litter, foreshore, 1985 Zoological Expedition to Krakatau (NMV). **Malaysia:** Sarawak: 1 ♀, Kampong Segu [01°33'N, 110°20'E], 20 miles SW. of Kuching, 4 June 1968, leafmould berlesate, rainforest, R.W. Taylor (ANIC).

Diagnosis

Males of *A. jerai* differ from all other species by the lack of a lateral flange or distal bifurcations on the dorsal element of the conductor (C2) and by the lack of a basally expanded ventral element of the conductor (C1) (Figures 12). Females cannot be separated from those of *A. bifurcata* but differ from all other species by the following combination of characters: spermathecae spherical (Figure 14); median epigynal duct reaching to tip of spermathecae (Figure 14); and femur I 0.26 mm in length.

Description

Male (Holotype)

Total length 0.41. Carapace 0.20 long, 0.21 wide, 0.11 high. Femur I 0.29 long. Colour entirely pale yellow. Carapace with 8 setae, 4 on clypeus, 2 on eyes, and 2 on posterior ridge of pars cephalica; pars cephalica only slightly higher than pars thoracica; 4 distinct eyes, surrounded by dark pigment; PME completely absent. Chelicerae fused only subbasally; distal lobe of fang furrow with 2 conical teeth. Sternum posteriorly truncate. Pedipalp (Figures 12, 13): femur without tubercles on ventral face; tibia without retrolateral apophysis; cymbium broad and cup-shaped, with hooked basal paracymbium; embolus coiled twice, embolic duct looped; median apophysis distally



Figures 12–14 *Anapistula jerai* sp. nov., holotype ♂: 12, left pedipalp, retrolateral; 13, left bulb, with conductor omitted, showing embolic duct; paratype female (from Kampong Segu, Sarawak, Malaysia): 14, epigyne, ventral.

broad; conductor comprising two discrete elements which enclose the embolus: ventral element (C1) basally narrow and gradually tapering to a distal pointed projection; dorsal element (C2) subdistally spatulate with broad circular depression. Legs: femur I without tubercles; all patellae with retrolateral protuberance containing patch of lyriform organs; all tarsal claws without teeth. Posterior spiracles present. Colulus absent.

Female (ANIC, from Kampong Segu, Sarawak)

Total length 0.48. Carapace 0.21 long, 0.17 wide, 0.09 high. Femur I 0.26 long. Colour entirely pale yellow, except for sclerotised internal genitalia and pigment surrounding eyes. Carapace with 8 setae, 4 on clypeus, 2 on eyes, and 2 on posterior ridge of pars cephalica; pars cephalica only slightly higher than pars thoracica; 4 distinct eyes, surrounded by dark pigment; PME completely absent. Chelicerae fused only subbasally; distal lobe of fang furrow with 2 conical teeth. Sternum posteriorly truncate. Pedipalp absent except for coxa. Legs: femur I without tubercles; all patellae with retrolateral protuberance containing patch of lyriform organs; all tarsal claws without teeth. Epigyne (Figure 14): spermathecae spherical, connected to single T-shaped copulatory duct; bases of copulatory duct with anterior swelling; heavily sclerotised

triangular apophysis absent. Posterior spiracles present. Colulus absent.

Remarks

Anapistula jerai is known from four southeast Asian localities: Gunong Jerai, northern Malaya; southwestern Sarawak; southern Kalimantan; and Anak Krakatau in the Sunda Strait. The latter is an island formed during the 1930's as a result of volcanic activity of the active volcano Krakatau (Thornton and Rosengren 1988). The association of these four specimens is slightly tenuous, but can be supported by the extremely small size of all specimens, and by their relative geographical proximity. More males are required from the region to confirm the association of the three females with the male from Kedah.

Etymology

The specific epithet is a noun in apposition taken from the type locality.

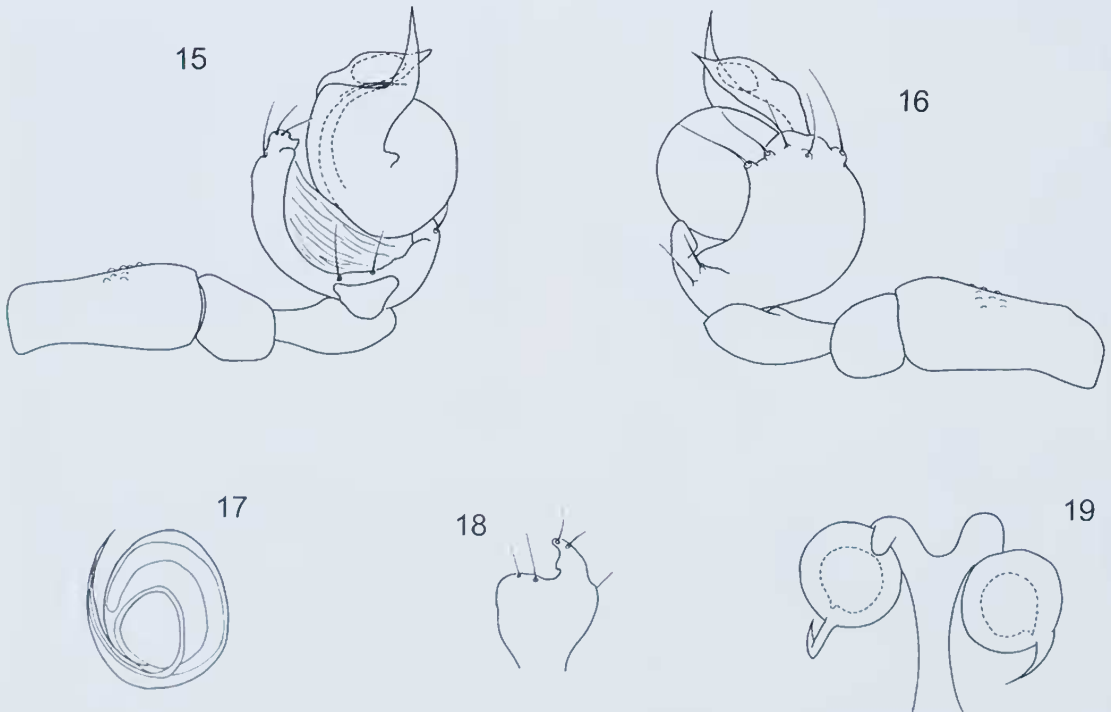
Anapistula tonga sp. nov.

Figures 15–19

Material Examined

Holotype

♂, Tongatapu, Tonga [ca. 21°10'S, 175°10'W], 12 March 1988, 88–014, [T.] Iliffe (AMNH).



Figures 15–19 *Anapistula tonga* sp. nov., holotype ♂: 15, left pedipalp, retrolateral; 16, left pedipalp, prolateral; 17, left bulb, with conductor omitted, showing embolic duct; 18, right paracymbium, dorsal; paratype female: 19, epigyne, ventral.

Paratypes

Tongatapu: 3 ♀, same data as holotype (AMNH).

Diagnosis

Males differ by the shape of the ventral element of the conductor (C1) which is basally very broad and abruptly tapering (Figure 15). Females differ by the following combination of characters: spermathecae spherical (Figure 19), median epigynal duct reaching to tip of spermathecae (Figure 19), and femur I 0.32 mm in length.

Description*Male (Holotype)*

Total length 0.65. Carapace 0.25 long, 0.26 wide, 0.12 high. Femur I 0.32 long. Colour entirely pale yellow. Carapace apparently with 6 setae, 4 on clypeus and 2 on eyes; pars cephalica only slightly higher than pars thoracica; 4 small, distinct eyes, but not surrounded by dark pigment; PME completely absent. Chelicerae fused only subbasally; distal lobe of fang furrow with 2 conical teeth, mesal tooth slightly larger than lateral tooth. Sternum posteriorly truncate. Pedipalp (Figures 15–18): femur with small tubercles on antero-ventral face; tibia without retrolateral apophysis; cymbium broad and cup-shaped, with hooked basal paracymbium; embolus coiled twice, embolic duct looped; median apophysis small, conical; conductor comprising two discrete elements which enclose

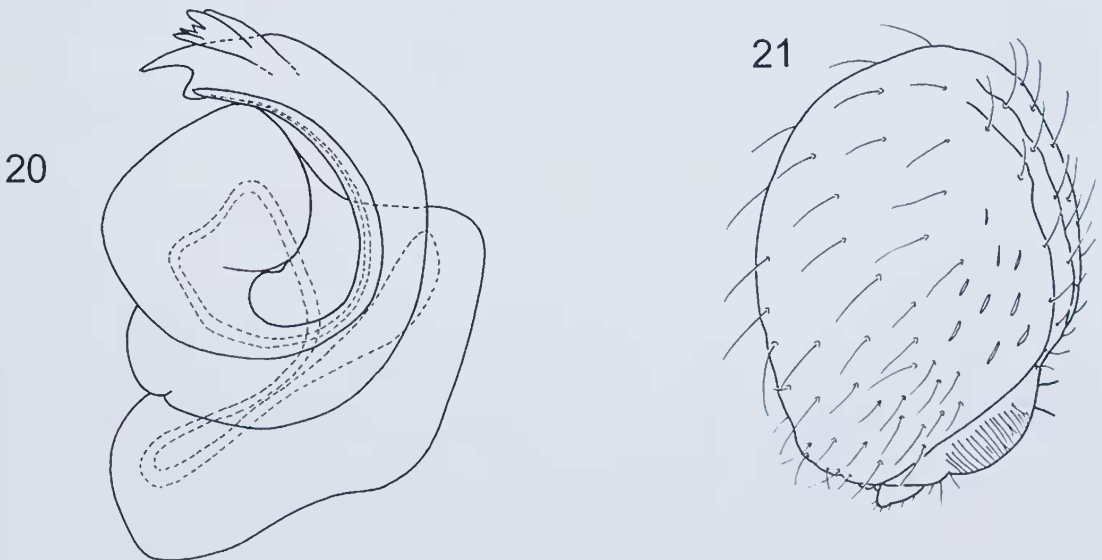
the embolus: ventral element (C1) basally very broad and abruptly tapering to a distal pointed projection; dorsal element (C2) subdistally spatulate with broad circular depression. Legs: femur I without tubercles; all patellae with retrolateral protuberance containing patch of lyriform organs; all tarsal claws without teeth. Posterior spiracles present. Colulus absent.

Female (Paratype)

Total length 0.66. Carapace 0.24 long, 0.21 wide, 0.15 high. Femur I 0.32 long. Colour entirely pale yellow, except for sclerotised internal genitalia. Carapace apparently with 6 setae, 4 on clypeus and 2 on eyes; pars cephalica only slightly higher than pars thoracica; 4 small, distinct eyes, but not surrounded by dark pigment; PME completely absent. Chelicerae fused only subbasally; distal lobe of fang furrow with 2 conical teeth. Sternum posteriorly truncate. Pedipalp absent except for coxa. Legs: femur I without tubercles; all patellae with retrolateral protuberance containing patch of lyriform organs; all tarsal claws without teeth. Epigyne (Figure 19): spermathecae spherical, connected to single T-shaped copulatory duct; bases of copulatory duct with anterior swelling; heavily sclerotised triangular apophysis absent. Posterior spiracles present. Colulus absent.

Remarks

This large species is known only from Tongatapu situated in the Pacific Ocean.



Figures 20–21 *Anapistula boneti* Forster, holotype ♂: 20, right pedipalpal cymbium and bulb, prolateral; 21, abdomen, lateral.

Etymology

The specific epithet is a noun in apposition taken from the type locality.

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REFERENCES

- Baert, L. and Jocqué, R. (1993). *Anapistula caecula* n. sp., the smallest known female spider (Araneae, Symphytognathidae). *Journal of African Zoology* 107: 187-189.
- Coddington, J. A. (1990). Ontogeny and homology in the male palpus of orb-weaving spiders and their relatives, with comments on phylogeny (Araneoclada: Araneoidea, Deinopoidea). *Smithsonian Contributions to Zoology* 496: 1-52.
- Coddington, J.A. and Levi, H.W. (1991). Systematics and evolution of spiders (Araneae). *Annual Review of Ecology and Systematics* 22: 565-592.
- Forster, R.R. (1958). Spiders of the spider Symphytognathidae from North and South America. *American Museum Novitates* 1885: 1-14.
- Forster, R.R. (1959). The spiders of the family Symphytognathidae. *Transactions of the Royal Society of New Zealand* 86: 269-329.
- Forster, R.R. and Platnick, N.I. (1977). A review of the spider family Symphytognathidae (Arachnida, Araneae). *American Museum Novitates* 2619: 1-29.
- Gertsch, W.J. (1941). Report on some arachnids from Barro Colorado Island, Canal Zone. *American Museum Novitates* 1146: 1-14.
- Gertsch, W.J. (1960). Descriptions of American spiders of the family Symphytognathidae. *American Museum Novitates* 1981: 1-40.
- Gray, M.R. (1989). Cavernicolous spiders (Araneae) [sic] from Undara, Queensland and Cape Range, Western Australia. *Helictite* 27: 87-89.
- Griswold, C.E. (1987). The spider genus *Symphytognatha* Hickman (Araneae: Symphytognathidae) newly described from Africa. *Annals of the Natal Museum* 28: 133-136.
- Harvey, M.S. (1992). A new species of *Symphytognatha* Hickman (Araneae: Symphytognathidae) from Western Australia. *Records of the Western Australian Museum* 15: 685-689.
- Harvey, M.S., Gray, M.R., Hunt, G.S. and Lee, D.C. (1993). The cavernicolous Arachnida and Myriapoda of Cape Range, Western Australia. *Records of the Western Australian Museum, Supplement* 45: 129-144.
- Humphreys, W.F. (1993). The significance of the subterranean fauna in biogeographical reconstruction: examples from Cape Range peninsula, Western Australia. *Records of the Western Australian Museum, Supplement* 45: 165-192.
- Platnick, N.I. and Forster, R.R. (1989). A revision of the temperate South American and Australasian spiders of the family Anapidae (Araneae, Araneoidea). *Bulletin of the American Museum of Natural History* 190: 1-139.
- Saaristo, M. (1996). Symphytognathidae (Arachnida, Araneae), a new spider family for the granitic islands of Seychelles. *Phelsuma* 4: 53-56.
- Thornton, I.W.B. and Rosengren, N.J. (1988). Zoological expeditions to the Krakatau Islands, 1984 and 1985: general introduction. *Philosophical Transactions of the Royal Society of London B* 322: 273-316.

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